

A REVIEW OF THE FAMILY NANNODASTIIDAE (DIPTERA)

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Abstract.—The two genera and five species currently assigned to the family Nannodastiidae are reviewed. The genera, *Azorastia* Frey and *Nannodastia* Hendel, are very similar and closely related, although each was originally described in a different family, Asteiidae and Ephyridae respectively. Adults of both genera are very small, lengths often less than 1 mm, and exhibit many highly derived, often reduced, structures, making their phylogenetic placement enigmatic. Thus, we remain unsure of the family's phylogenetic relationships and placement in acalyprate classification or even of the group's status as a family. *Nannodastia atlantica* is newly described (type locality: Belize. Stann Creek District: Glover's Reef (Long Cay)) and is the first record of this genus in the New World.

Key Words: review, Diptera, Nannodastiidae, *Azorastia*, *Nannodastia*

The higher classification of many taxa included in the so-called acalyprate Diptera remains an inscrutable puzzle, frequently lacking resolution at essentially any level (Yeates and Wiegmann 1999). This perplexing condition is particularly true of taxa that have highly derived morphological structures, often greatly reduced, as exemplified by the "Nannodastiidae." The Nannodastiidae were accorded familial status less than 10 years ago (Carles-Tolrá 1994) largely because they did not agree with the characterization of any other known family and because of the unusual morphology, extremely small size, and reduction of structures. The objectives of our review of this so-called family, are to describe a new species in the genus *Nannodastia* Hendel, to provide new information on the distribution and morphology of the group, and to highlight this poorly known family in an attempt to foster further research on it.

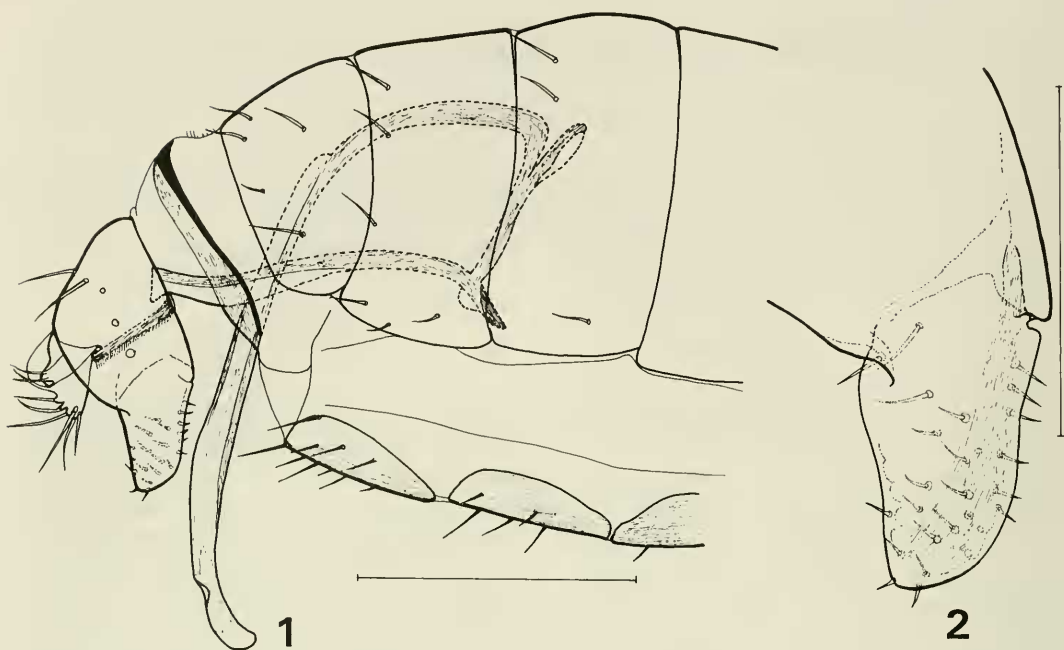
The descriptive terminology follows

Papp (1980). Because specimens are extremely small, often less than 1 mm in length, study and illustration of the male and female terminalia required use of a compound microscope. Except for the new species, other species are provided with a diagnosis in the appropriate key to species.

Family Nannodastiidae L. Papp

Nannodastiinae L. Papp 1980:425 [subfamily in Ephyridae]. Type genus: *Nannodastia* Hendel 1930.—Cogan 1984:144 [Palearctic catalog, subfamily in Ephyridae].—Pitkin 1989:600 [Australasian and Oceanian catalog, subfamily in Chyromyidae].—Mathis 1989:6–7 [*Nannodastia* in Chyromyidae].—Colless and McAlpine 1991:766, 773 [subfamily in Chyromyidae].

Nannodastiidae: Carles-Tolrá 1994:199 [accorded familial status].—L. Papp and Mathis 1998:309–314 [review of Palearctic fauna].



Figs. 1–2. *Azorastia minutissima*, paratype male. 1, Posterior portion of preabdomen and genitalia in lateral view. 2, Surstylus in widest view. Scales: 0.2 mm for Fig. 1; 0.1 mm for Fig. 2.

Diagnosis.—Minute to very small flies, length 0.70–1.25 mm; body mostly brown, generally dull colored, sparsely to moderately microtomentose; wings hyaline; legs lacking long setae.

Head: higher than long; 3 reclinate fronto-orbital setae, anterior seta inserted at level of lunule; inner and outer vertical and ocellar setae distinct, ocellar seta inserted immediately laterad of anterior ocellus; postvertical seta lacking; 1 pair of minute, moderately divergent and proclinate postocellar setulae. Antenna: scape small; pedicel lacking a suture, bearing long setae dorsally and ventrally, with a process (projected into the flagellomere cavity, see Figs. 3, 16) apically or ventroapically; flagellomere with a posterior cavity, bearing very long setae apically; arista short, bearing sparse short rays (see Figs. 3, 16). Face small in width and height, weakly sclerotized medially; ventral facial margin straight to very shallowly convex; clypeus small; 3 well-developed, slightly upcurved, parafacial setae

and some rather long peristomal setae; vibrissae and a vibrissal angle lacking.

Thorax: 1 dorsocentral seta (0+1); 1 postalar seta; 2 scutellar setae, apical seta longer, curved dorsally; 1 row of dorsocentral setulae; 1 row of intra-alar setulae; acrostichal setulae in 2 mostly regularly arranged rows; postpronotal setae lacking; 2 notopleural setae, posterior seta inserted at much higher level than anterior seta; 4–5 anepisternal setae, 2–3 curved dorsally; 1 katepisternal seta. Legs lacking characteristic setae (see Fig. 19 of L. Papp 1980). Wing hyaline; costal vein broken twice, basal break distad to humeral vein, apical break just before vein R₁; subcosta rudimentary, blunt apex free; vein M thin; crossvein r-m lacking; crossvein dm-cu present or absent; anal cell and anal vein lacking; alula lacking; wing margin bearing long fringe. Halter short, knob comparatively large.

Abdomen: Spiracles apparently lacking. Male abdomen with 6 exposed segments

(Figs. 1, 18–19), tergites 1 and 2 separate, although tergite 1 very short and thin medially, 1st segment otherwise not too short; a transverse narrow sclerite in membrane between tergite 6 and epandrium, forming a half ring (here considered a synsternite 7+8). Male postabdomen symmetrical; epandrium with or without a posteroventral process; lateral wall of surstylus fused with epandrium (but not medial wall); cerci weakly sclerotized, bearing very long setae; genitalia comprising a lever structure; hypandrium elongate, rather dorsally placed on epandrium, fused anteriorly with lateral extensions of aedeagal apodeme; aedeagal apodeme fused with aedeagus; aedeagus elongate; gonopods or parameres lacking; a sclerotized plate connecting posterior ends of hypandrium and cerci (under the epandrium) that is here considered an interparameral sclerite (perhaps sternite 10); genital opening bordered by hypandrial arms (L. Papp 1980). Papp (1980) described the function of the genitalia but misinterpreted the aedeagus and some other structures of the terminalia. Female abdomen normal; tergites 7–8 undivided, but more strongly sclerotized laterally; last dorsal sclerites of female (here interpreted as cerci+epiproct) as weakly sclerotized plates, bearing long (*Azorastia*) or short (*Nannodastia*) setae; spermathecae and a sclerotized ventral receptacle apparently lacking.

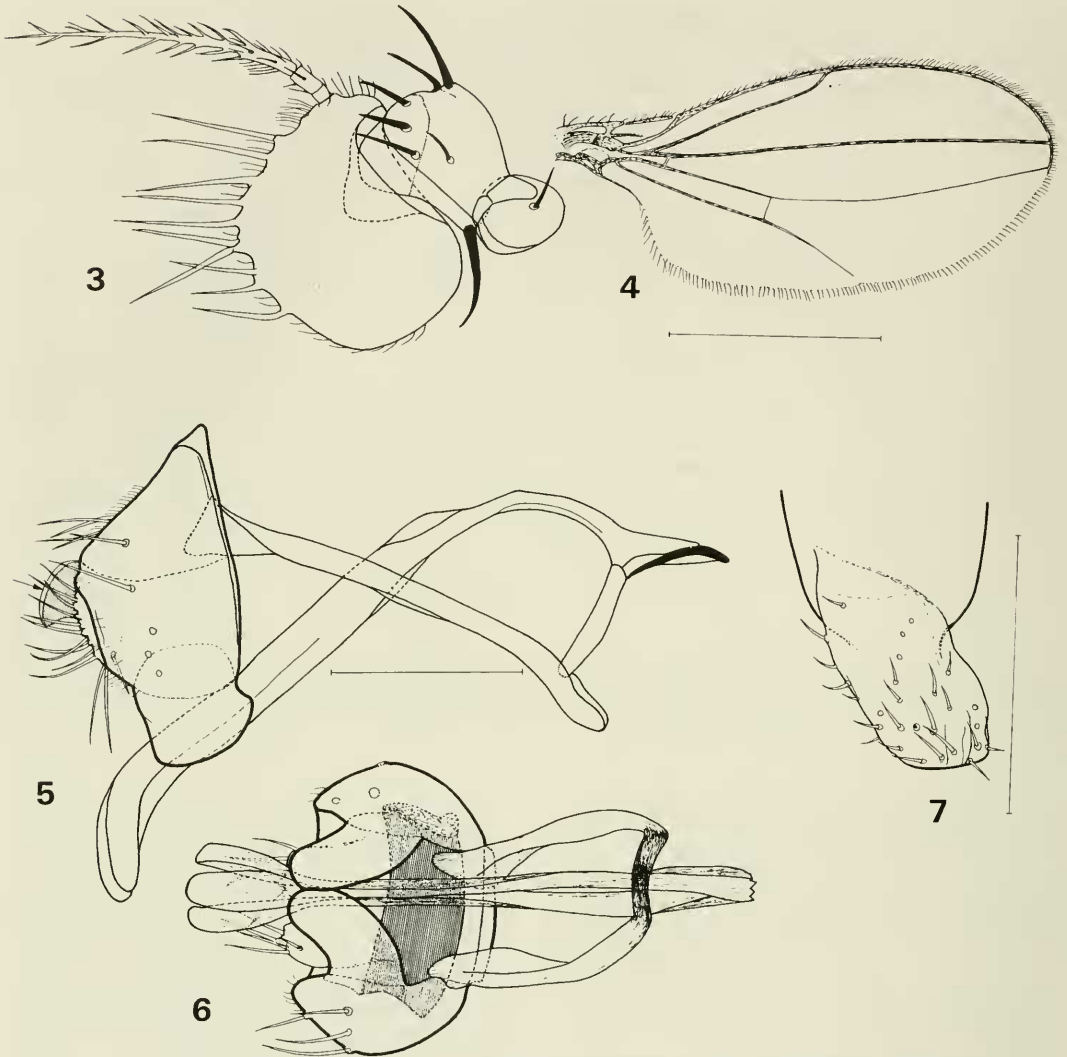
Discussion.—The two genera comprising this family remain enigmatic with essentially unknown familial affiliations within the Schizophora (Opomyzoidea/Carnoidea). The type genus, *Nannodastia* Hendel, was first described in the Ephyridae, and *Azorastia* Frey, the only other included genus, in the Asteiidae. Sabrosky (1956) first noted a close relationship between these genera, and he, followed by Frey (1958) and Sabrosky and Wirth (1959), treated these genera as members of the family Ephyridae, tribe Atissini. L. Papp (1980) described Nannodastiinae as a subfamily of Ephyridae, based in part on the advice of other acalyptratae experts. L. Papp (1980: 426),

however, qualified his classification with the statement that: “The majority of the above differences [of Nannodastiinae and other ephyrid subfamilies] separate superfamilies in Griffiths’ (1972) system; they seem sufficient to separate subfamilies here.” Pitkin (1989), as part of the Australasian/Oceanian catalog, recognized Nannodastiinae as a subfamily in the family Chyromyidae. No synapomorphies linking these two families have been elaborated, however (the number and position of the fronto-orbital setae are regarded as a convergence, shared by other families, such as the Tethinidae and Acartophthalmidae), and familial affiliations remain unsubstantiated.

We have not discovered the sister group of Nannodastiidae nor its placement among the superfamilies of Griffiths (1972: Fig. 14), partially as a consequence of the reduced and highly modified morphology. For the present, we are uncertain about the relationships of Nannodastiidae except that they lack the synapomorphies that characterize Ephydroidea (Zatwarnicki 1992, Mathis and Zatwarnicki 1998), and we are likewise doubtful of Chyromyidae.

The two genera presently included in Nannodastiidae, *Azorastia* and *Nannodastia*, are very similar externally, as are, to lesser extent, the structures of the male terminalia. Their close resemblance led Sabrosky and Wirth (1959) and L. Papp (1980) to question their status as distinct genera. We confirm their similarity, and certainly the two groups are sister taxa, but until their familial placement is resolved, we prefer to recognize them as distinct genera. Although similar, the two genera are easily diagnosed by external characters and by structures of the male terminalia.

Natural history.—Adults, which are very small (often less than 1 mm), are usually associated with maritime beaches in tropical and subtropical zones. Specimens were often collected in caves or under cliff overhangs where the substrate was rich in organic matter from the droppings of bats, small mammals, and birds. Nothing is



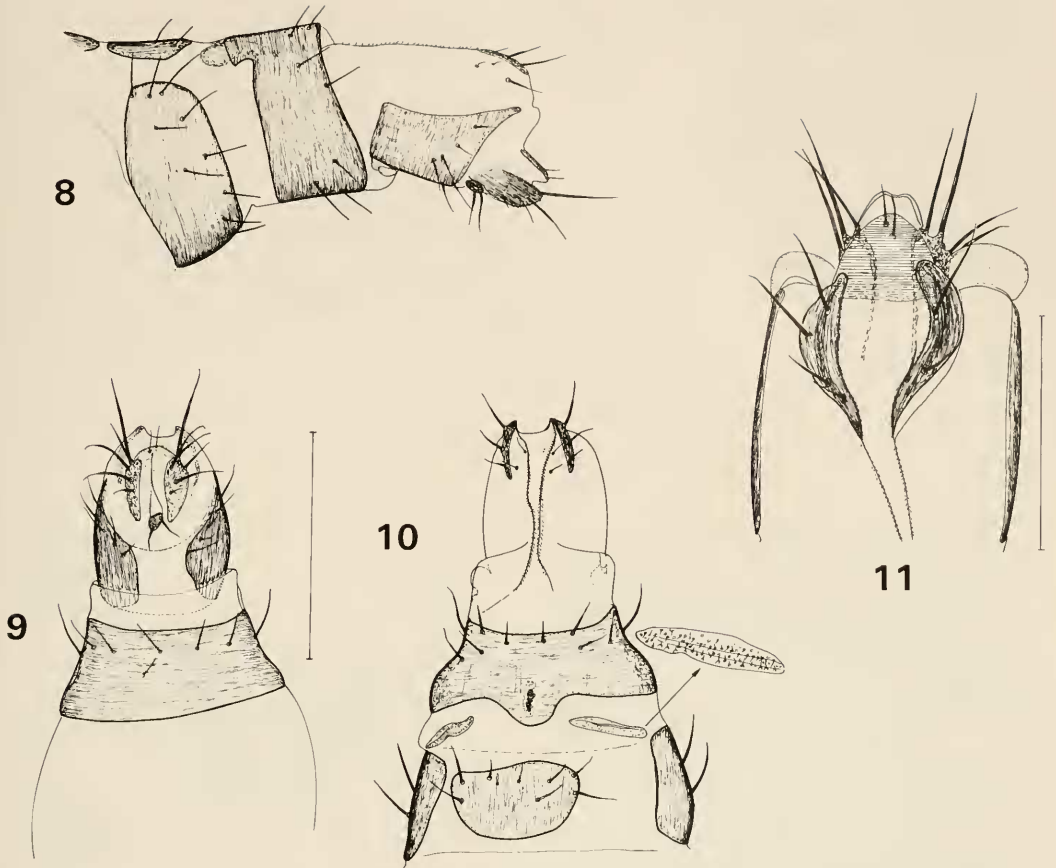
Figs. 3-7. *Azorastia mediterranea*, male. 3, Antenna, medial view. 4, Wing, dorsal view. 5, Genitalia, lateral view (anus shown by a small arrow). 6, Same, ventral view (hypandrium foreshortened, interparameral sclerite hatched). 7, Right surstylus in widest, medial view, i.e., posterior edge at right. Scales: 0.5 mm for Fig. 4; 0.1 mm for Figs. 3, 5-7.

known about the immatures, although presumably they are in the richly organic substrate.

KEY TO GENERA OF NANNODASTIIDAE

1. Crossvein dm-cu lacking (Fig. 17); vein M attenuate apically, not extended to wing margin; costal vein continued past apex of vein R_{2+3} but not to vein M. Male sytergosternite 7+8 very much reduced (Figs. 18-19); epandrium with a posteroventral process, bearing a thick thornlike structure apically (Figs. 12, 20); an-

terior portion of surstylus bearing 3 long setae; posterior portion with a digitiform process with 3 thornlike setae apically; hypandrium less dorsally placed on epandrium (Figs. 13, 22), shorter, anterior part robust with ventral dilatation. Female cerci bearing short setulae only (Figs. 24-27) *Nannodastia* Hendel
 - Crossvein dm-cu present (Fig. 4); vein M distinct to wing margin; costal vein extended to vein M. Male sytergosternite 7+8 distinct (Fig. 1); epandrium lacking a posteroventral process; surstyli longer without any processes or thorns, medial surface with numerous short



Figs. 8–11. *Azorastia gemmae*. 8. Postabdomen of paratype female, lateral view. 9. Same, dorsal view. 10. Same, ventral view (with the right evertible sack in 2× magnification). 11. Genital opening with its sclerites in ventral view, higher magnification, hypoproct dashed. Scales: 0.2 mm for Figs. 8–10; 0.1 mm for Fig. 11.

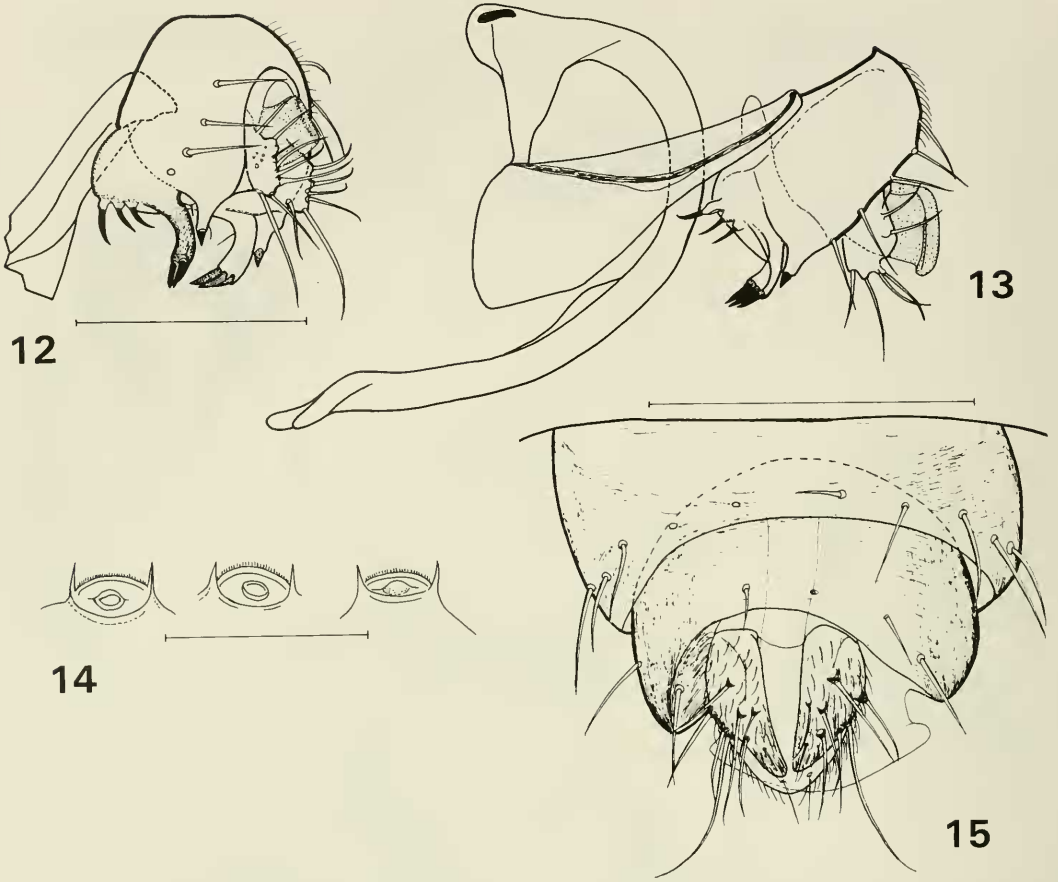
setae (Figs. 1–2, 5–7); hypandrium rather dorsally placed on epandrium (Fig. 6); hypandrium and aedeagus very long and slender. Female cerci bearing at least 1 long seta (Figs. 8–9) *Azorastia* Frey

Genus *Azorastia* Frey

Azorastia Frey 1945:72 [misquoted as “1958:Commentat. biol., 18(4):40,” by Cogan (1984:144)]. Type species: *A. minutissima* Frey 1945, by original designation; 1958:40–41 [discussion, key to genera].—Sabrosky 1956:217 [removed from Asteiidae, placed in Ephydriidae, subfamily Psilopinae, tribe Atissini, near *Atissa* Haliday].—Sabrosky and Wirth 1956:18 [placed in Ephydriidae, tribe Atissini, compared with *Nannodastia*];

1959:109–110 [discussion, list, Hawaii (Oahu)].—L. Papp 1980:427–431 [review and diagnosis].—Cogan 1984:144 [Palearctic catalog].—Carles-Tolrá 1994:202 [list]; 1995:258 [list].—L. Papp and Mathis 1998:310–314 [figs., key, discussion].

Diagnosis.—*Azorastia* is distinguished from *Nannodastia* by the following combination of characters: Wing: crossvein dm-cu present (Fig. 4); vein M distinct to wing margin; costal vein extended to vein M. Male terminalia: syntergosternite 7+8 distinct (Fig. 1), normally retracted within tergite 6; epandrium lacking a ventroapical process; surstylus relatively long, lacking



Figs. 12-15. *Nammodastia atlantica*, holotype male. 12, Epandrium, surstyli, and cerci, oblique lateroventral view. 13, Genitalia, lateral view. 14, micropylar end of three eggs, sublateral view. 15, Postabdomen of female, dorsal view. Scales: 0.1 mm for Figs. 12-13; 0.2 mm for Fig. 14; 0.1 mm for Fig. 15.

any processes or thornlike setae, medial surface with numerous short setae (Figs. 1-2, 5-7), bearing setulae on medial surface, lacking contact with interparameral sclerite; lateral wall of surstylus fused with epandrium (but not medial wall); aedeagus in unflexed position with flat lamellae parallel with dorsum, horizontally turned out (Figs. 1, 5); hypandrium rather dorsally placed on epandrium (Fig. 6); hypandrium and aedeagus very long and slender. Female cerci bearing at least 1 long seta (Figs. 8-9).

KEY TO SPECIES OF THE GENUS *AZORASTIA*
FREY

1. Male surstylus very long, length over twice width, narrow basally, thereafter becoming

- wider to apical 1/3, then curved posteriorly and pointed (Figs. 1-2, 4 of Carles-Tolrà 1994) *A. gemmae* Carles-Tolrà
- Male surstylus moderately long to short, length less than twice width, not narrowed basally 2
- 2. Male surstylus short, apex more rounded, anterior edge more or less protuberant in profile (Figs. 5-7). Ratio of intercrossvein section of vein M/terminal section of vein Cu usually 1.00 *A. mediterranea* L. Papp
- Male surstylus moderately long, anterior margin nearly straight in lateral view (Figs. 1-2); Ratio of intercrossvein section of vein M 1.20-1.30 *A. minutissima* Frey

Azorastia minutissima Frey
(Figs. 1-2)

Azorastia minutissima Frey 1945:73; 1958: 40-41 [fig. of wing].—Sabrosky and

Wirth 1959:110 [placed in Ephydriidae, tribe Atissini].—L. Papp 1980:430 [lectotype designation].—Cogan 1984:144 [Palearctic catalog].—Carles-Tolrá 1994:202 [list].—L. Papp and Mathis 1998:310 [figs. of male terminalia].

Material examined.—The lectotype male (designated by L. Papp, 1980: 430) and 2 female paralectotypes; another three specimens of the type series not discussed by Papp (1980) are here recognized as paralectotypes: 1st paralectotype ♂ (ZMH, head and left wing lost): Azor: S. Miguel, Ribeira Grande, 26.V. Storå/2894/Mus. Zool. Helsinki Loan No. D 4954 [yellow]/Mus.Zool. Helsinki Loan No. D90-184. 2nd paralectotype ♀ (ZMH, head, legs and right wing lost, abdomen on a separate minuten): Azores: Flores, Sta Cruz, 1–15.VI. Storå/1086 [blue]/Mus.Zool. H:fors, Spec. typ. No. “89.95. *Azorastia minutissima* Frey”/as on previous label but with D 4952/as on previous label but with D90-183 (recognized here as a paralectotype; state of preservation poor). 3rd paralectotype ♂ (ZMH, originally double-mounted on a minuten, now abdomen and genitalia preserved in an Andersson’s microvial with glycerol): Azor: Flores, Sta Cruz, VI. Storå/4889 [blue]/Mus.Zool.H:fors, Spec. typ. No. “89-96 *Azorastia minutissima* Frey”/Mus.Zool. Helsinki Loan No. D 4953/Mus.Zool. Helsinki, No. D 90-185.

Measurements of the three paralectotypes noted previously: body length: 1.00–1.03 mm; wing length 0.98–1.12 mm; wing width 0.43–0.52 mm; distance between crossveins r-m and dm-cu/apical section of vein M 1.17–1.35. A very long seta on cercus ventrally (see L. Papp 1980:430).

Distribution.—*Palearctic*: Azores.

Remarks.—This species is closely related to *A. mediterranea* but differs in the shape of the male surstylus.

Azorastia mediterranea L. Papp
(Figs. 3–7)

Azorastia mediterranea L. Papp 1980:427.—L. Papp and Mathis 1998:309–

310 [habitus fig., figs. of male terminalia].

Material examined.—Type series (see L. Papp, 1980: 430). Newly collected material: ISRAEL. Migdal 'Afeq (32°05'N, 34°N57'E; also known as Midgal Zedek), 25 Jul 1976, A. Freidberg (9 ♂, 1 ♀); *ibid.*, 4 Sep 1977, A. Freidberg (11 ♂); *ibid.*, 24 Sep 1981, A. Freidberg, F. Kaplan (25 ♂, 3 ♀); *ibid.*, 11 Jul 1993, A. Freidberg (17 ♂, 1 ♀); *ibid.*, 3 Jun 2000, D. and W. N. Mathis (3 ♂) (HNHM, TAU, USNM).

Distribution.—*Palearctic*: Croatia (Dalmatia), Greece, Israel (new record), Tunisia.

Natural history.—The specimens from Israel were collected by sweeping just above the substrate within the cavelike ruins of an Ottoman fortress (Migdal Afeq) where sheep, goats, and other mammals often seek shelter. The fortress is not immediately coastal but is on the coastal plain, approximately 17.5 km from the eastern shore of the Mediterranean Sea.

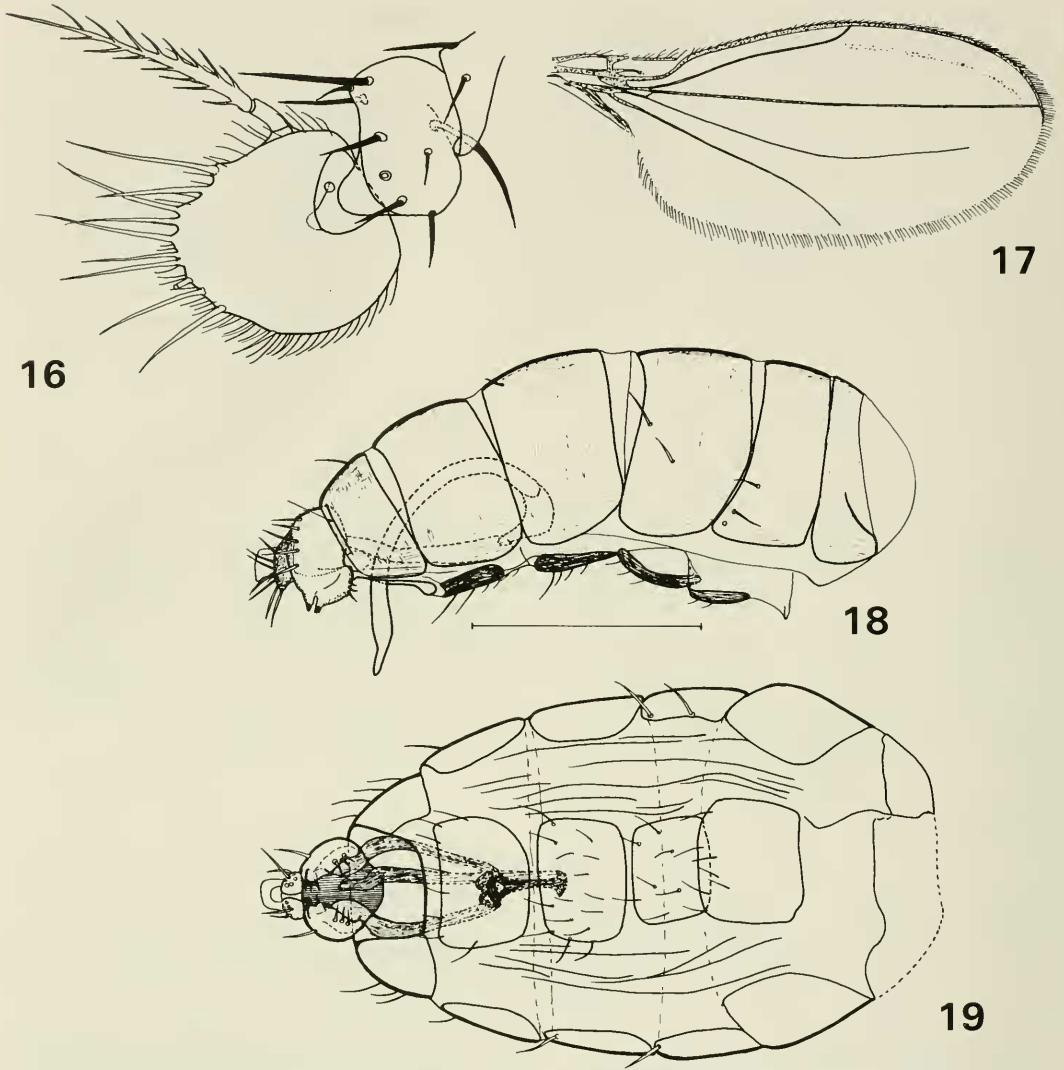
Azorastia gemmae Carles-Tolrá
(Figs. 8–11)

Azorastia gemmae Carles-Tolrá 1994:199; 1995:258 [list].

Material examined.—A paratype female is labeled (HNHM through exchange; compare with Carles-Tolrá 1994:201) “26–29.6.88 [26–29 Jun 1988], Ibiza (Balears), Punta Arabi, penado muerto, M. Carles-Tolrá leg/Azorastia gemmae Carles-Tolrá, PARATYPO ♀.” The paratype was mounted from alcohol on a 0.1 mm minuten. The abdomen is in an attached plastic microvial with glycerine.

Distribution.—*Palearctic*: Spain (Balearic Islands: Ibiza).

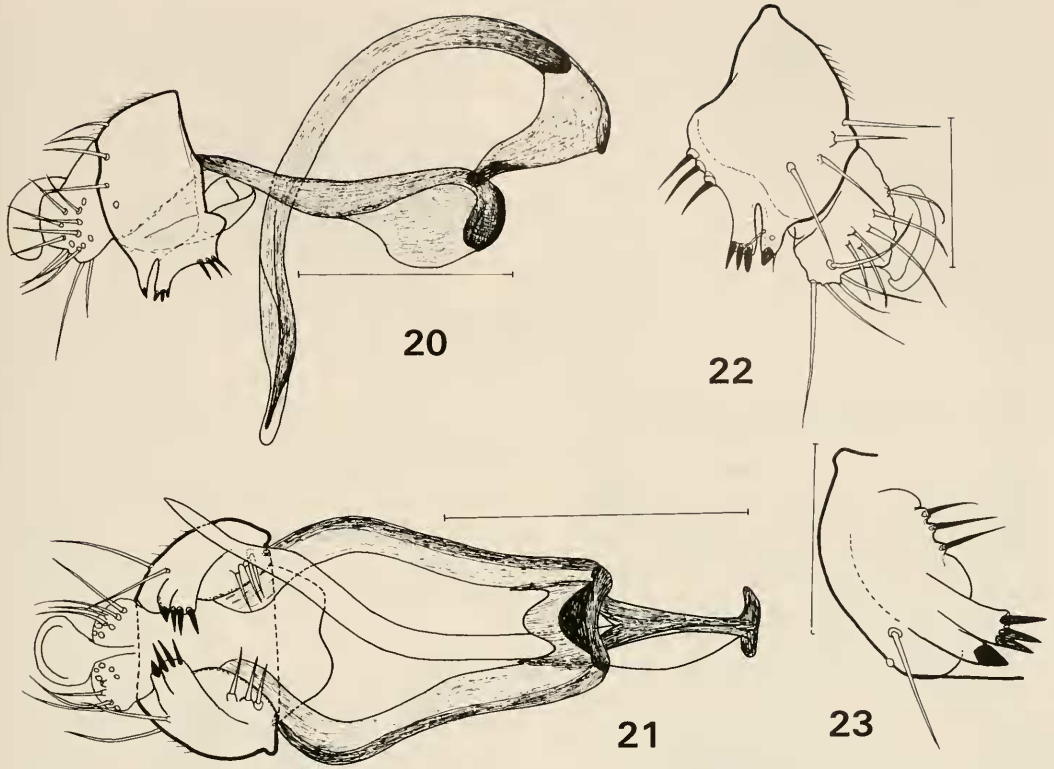
Remarks.—The following remarks are additions or corrections to Carles-Tolrá’s original description. The female preabdomen comprises 6 segments and the 6th is normally developed (Fig. 8). Segment 7 is a syntergosternite (Figs. 9–10) with a small medial subanterior dark spot on the sternal portion (also on Fig. 7 of Carles-Tolrá



Figs. 16–19. *Nannodastia horni*, male. 16, Antenna, medial view. 17, Wing, dorsal view. 18, Abdomen, lateral view. 19, Same, ventral view. Scales: 0.1 mm for Fig. 16; 0.5 mm for Fig. 17; 0.2 mm for Figs. 18–19.

1994). No “internal sclerites,” as in Carles-Tolrá’s Fig. 8, were observed in the paratype. We speculate that these might be sections of tracheae, although abdominal spiracles are not discernible in nannodastiids. Carles-Tolrá’s “lateral slightly sclerotized zones” were found between sclerites of the 6th and 7th segments, as in Fig. 10. They lack a definite shape, are three-dimensional (seen in Fig. 8), and the microchaetae inside are directed against each other. We suspect the microchaetae are eversible and are pos-

sibly invaginations of the integument (eversible sacks) for pheromone excretion. Tergite 8 is a pair of comparatively large lateral sclerites that are rather elongate ventrally. Sternite 8 is a pair of medium-long, narrow sclerites that are positioned on the apical part of a very large genital opening (Figs. 10–11); sternite 8 bears some medium-long setae. The very large genital opening correlates with the comparatively large eggs. The epiproct is a minute sclerite at the base of the cerci and bears a pair of asymmet-



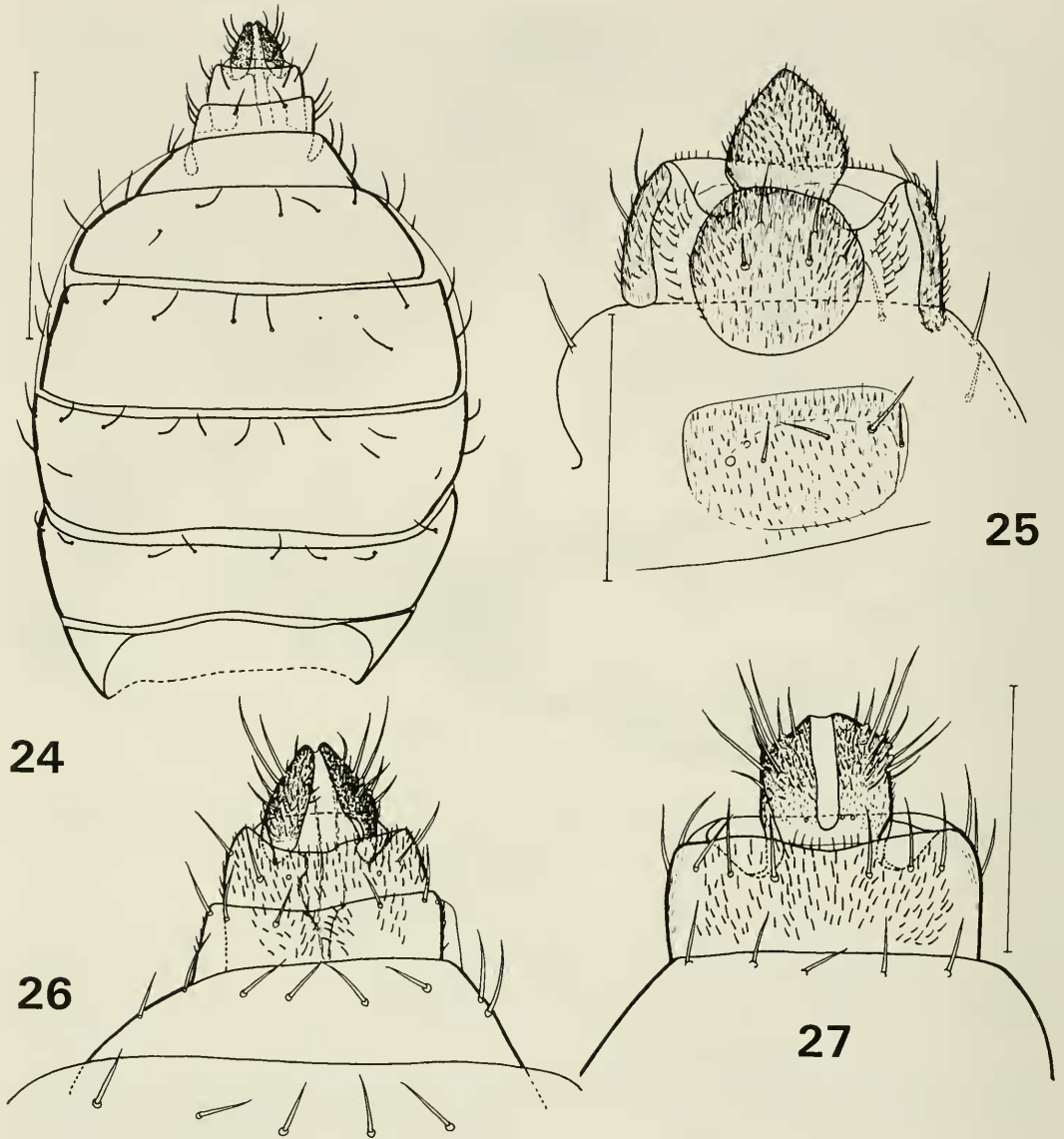
Figs. 20–23. *Nannodastia horni*, male. 20, Genitalia, lateral view. 21, Same, ventral view. 22, Epandrium, surstylus, and cercus, lateral view. 23, Surstylus of a 2nd specimen, ventral view. Scales: 0.1 mm for Figs. 21–22; 0.05 mm for Figs. 20, 23.

rically placed, comparatively long setae (Figs. 8–9). The hypoproct (Figs. 8, 11), although not very small, is weakly sclerotized and bears a pair of asymmetrical, short setae (Fig. 11). The cerci (Figs. 8–9) are moderate sized and bear two pairs of very long and some shorter setae.

Genus *Nannodastia* Hendel

Nannodastia Hendel 1930:68. Type species: *N. horni* Hendel 1930:70, by original designation.—Frey 1958:40–41 [discussion].—Sabrosky 1956:217 [placed in Ephyridae, subfamily Psilopinae, tribe Atissini, near *Atissa* Haliday].—Sabrosky and Wirth 1956:18 [list, Hawaii, Oahu]; 1959:109–110 [discussion, placed in Ephyridae, tribe Atissini, compared with *Azorastia*].—Sabrosky 1999:209–210 [nomenclature].

Diagnosis.—*Nannodastia* is distinguished from *Azorastia* by the following combination of characters: Wing: crossvein dm-cu lacking (Fig. 17); vein M attenuate apically, not extended to wing margin; costal vein continued past apex of vein R_{2+3} but not to vein M. Male terminalia: sytergosternite 7+8 greatly reduced (Figs. 18–19), almost lacking, only a thin, half ring in membrane between tergite 6 and epandrium; epandrium with a posteroventral process, bearing a thick thornlike structure apically (Figs. 13, 20); anterior portion of surstylus bearing 3 long setae; posterior portion with a digitiform process with 3 thornlike setae apically; hypandrium less dorsally placed on epandrium (Fig. 19), shorter, anterior portion robust with ventrally directed, dilated process. Female cerci bearing short setae only (Figs. 24–27).



Figs. 24-27. *Nannodastia horni*, female. 24, Abdomen, dorsal view. 25, Postabdomen, ventral view. 26, Posterior end of abdomen, dorsal view. 27, Same with cerci flattened, dorsal view. Scales: 0.2 mm for Fig. 24; 0.1 mm for Figs. 25-27.

Egg (from abdomen of *N. atlantica* paratype female) comparatively large, up to 0.25 mm (length of female abdomen about 0.55 mm). Micropylar end (Fig. 14) with a pair of small thin and pointed processes. Chorion with curved or meandering longitudinal grooves of uneven length (as in some Ephydriidae).

KEY TO SPECIES OF THE GENUS *NANNODASTIA* HENDEL

1. Epandrial process much shorter than posterior process of surstylus (Figs. 12-13); thick setae on anterior portion of surstylus on projections (particularly anterior seta); surstylar process somewhat slender and long (Figs. 12-13); hypandrium short, not much longer than height of epandrium *N. atlantica*, new species

– Epandrial process nearly as long as posterior process of surstylus (Figs. 18–22); thick setae on anterior part of surstylus sessile (Figs. 20–23); surstylar process slightly thicker than in *N. atlantica*; hypandrium nearly twice as long as height of epandrium *N. horni* Hendel

***Nannodastia atlantica* L. Papp and Mathis, new species**
(Figs. 12–15)

Nannodastia atlantica L. Papp and Mathis 1998:312 [*nomen nudum*; figs. of female terminalia].

Description.—A minute brown fly: length of body 0.86–1.05 mm (holotype 0.86 mm); wing length 0.87–0.96 mm (holotype 0.87 mm), wing width 0.38–0.41 mm (holotype 0.38 mm).

Very similar to *N. horni* in having 3 pairs of long parafacial setae and several shorter peristomal setae; 1 pair of minute postocellar setulae just behind posterior ocelli; 2 anterior pairs of fronto-orbitals distinct though very short; acrostichal setulae arranged in 2 mostly regular rows; second/third costal sections 0.28/0.33 mm, ratio 0.84 (holotype), 0.29/0.38 mm, ratio 0.77 (1 female paratype); halter dark brown.

So far as we can determine, the only diagnostic characters are in the male genitalia: epandrial process much shorter than posterior process of surstylus (Figs. 12–13); thick setae on anterior portion of surstylus on stalks (particularly the anterior seta); surstylar process somewhat slender and long (Figs. 12–13); hypandrium short, not much longer than height of epandrium (see key). The armature of the female cerci is virtually identical to that of *N. horni* (Figs. 15, 24–27).

Type material.—The holotype ♂ is labeled “BELIZE. Stann Creek District: Glover’s Reef, Long Cay[,] 27–28 July 1989[,] Wayne N. Mathis.” The holotype is double mounted (minuten in block of plastic), is in good condition (eyes collapsed; abdomen removed, dissected, and stored in an attached microvial), and is deposited in the USNM. Four paratypes (3 ♀ USNM, 1

♀ HNHM) bear the same label data as the holotype. Other paratype: BARBADOS. Christ Church: Bockley Beach (13°4.4’N, 59°35.3’W), 1 Sep 1997, W. N. Mathis (1 ♀ USNM).

Distribution.—*Neotropical*: Belize, West Indies (Barbados).

Etymology.—This species, occurring in Belize and on Barbados and possibly on other seashores of the Atlantic Ocean, is named *atlantica*.

***Nannodastia horni* Hendel**
(Figs. 16–27)

Nannodastia horni Hendel 1930:70.—Frey 1958:40–41 [discussion].—Sabrosky and Wirth 1956:18 [list as *Nannodastia* sp, Hawaii, Oahu]; 1959:109–110 [discussion, Ephydridae in tribe Atissini].—L. Papp, 1980:426.—Pitkin 1989:600 [Australasian and Oceanian catalog, in Chyromyidae].—Mathis 1998:6–7 [list, Henderson Island].

Material examined.—Holotype ♀ and 1 additional ♀ (DEI); for data see L. Papp (1980:426). Newly collected material: AUSTRALIA. Christmas Island (10°30’S, 105°34’E): near Hosnie Spring, Oct 1983, L. Hill (2 ♀; AM). HENDERSON ISLAND (24°04’S, 129°07’W). North Beach, 17–20 May 1987, W. N. Mathis (4 ♂, 9 ♀; USNM); Northwest beach, 17–20 May 1987, W. N. Mathis (6 ♂, 3 ♀; USNM). PITCAIRN ISLAND (24°04’S, 130°06’W), Down Rope, 25 May 1987, W. N. Mathis (3 ♂; USNM). HAWAII. Oahu: Kailua (at window near beach), 1 Jun 1946, W. W. Wirth (4 ♀; USNM). PAPUA NEW GUINEA. Central: Hisiu (swept from coastal Pandanus), 13 Jul 1986, J. W. Ismay (2 ♂; AM).

Distribution.—*Australasian/Oceanian*: Christmas Island (new record), Hawaii (Oahu), Henderson Island, Papua New Guinea (new record), Pitcairn Island (new record). *Oriental*: Taiwan. This species is probably widespread in the Pacific basin along maritime shores in tropical and subtropical zones.

Remarks.—The specimens from the Pitcairn Group of islands were collected in caves and under cliff overhangs above the beach and on the cliff face.

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LITERATURE CITED

- Carles-Tolrá, M. 1994. *Azorastia gemmae*: a new nannodastiid species from the Isle of Ibiza (Spain, Balearic Isles) (Insecta: Diptera: Nannodastiidae). *Reichenbachia* 30(34): 199–202.
- . 1995. Nuevas citas de dípteros acalípteros para las Islas Baleares, junto con una lista preliminar de once familias (Diptera: Acalyprata). *Boletín de la Asociación Española de Entomología* 19(1–2): 253–265.
- Cogan, B. H. 1984. Family Ephydriidae, pp. 126–176. In Soós, A. and L. Papp, eds., *Catalogue of Palaearctic Diptera*, Vol. 10. Elsevier Science Publishers, Amsterdam, and Akadémiai Kiadó, Budapest, 402 pp.
- Colless, D. H. and D. K. McAlpine. 1991. Diptera (flies), pp. 717–786. In *The insects of Australia*. A textbook for students and research workers, 2nd ed. Vol. 2. Melbourne University Press, Melbourne, 1137 pp.
- Frey, R. 1945. Tiergeographische Studien über die Dipteren der Azoren. *Societas Scientiarum Fennica. Commentationes Biologicae* 8(10): 1–114.
- . 1958. Zur Kenntnis der Diptera brachycera p.p. der Kapverdischen Inseln. *Societas Scientiarum Fennica. Commentationes Biologicae* 18(4): 1–61.
- Griffiths, G. C. D. 1972. The phylogenetic classification of Diptera Cyclorrhapha, with special reference to the structure of the male postabdomen. *The Hague, Junk ed., Series Entomologica* 8: 1–340.
- Hendel, F. 1930. Eine neue interessante Ephydridengattung (Dipt.). *Konowia* 9(1): 66–70.
- Mathis, W. N. 1989. Diptera (Insecta) or true flies of the Pitcairn Group (Ducie, Henderson, Oeno, and Pitcairn Islands). *Atoll Research Bulletin* 327: 1–15.
- Mathis, W. N. and T. Zlatwornicki. 1998. Chapter 49. Family Ephydriidae, pp. 537–570. In Papp, L., and Béla Darvas, eds., *Contributions to a Manual of Palaearctic Diptera* (with special reference to flies of economic importance), Vol. 3. Higher Brachycera. Science Herald, Budapest, 880 pp.
- Papp, L. 1980. New taxa of the acalyprate flies (Diptera: Tunisimyidiidae fam. n., Risidae, Ephydriidae: Nannodastiinae subfam. n.). *Acta Zoologica Hungarica* 26(4): 415–431.
- Papp, L. and W. N. Mathis. 1998. Chapter 27. Family Nannodastidae, pp. 309–314. In Papp, L., and Béla Darvas, eds., *Contributions to a Manual of Palaearctic Diptera* (with special reference to flies of economic importance), Vol. 3. Higher Brachycera. Science Herald, Budapest, 880 pp.
- Pitkin, B. R. 1989. 95. Family Chyromyidae, p. 600. In Evenhuis, N. L., ed., *Catalog of the Diptera of the Australasian and Oceanian Regions*, Bishop Museum Press and E.J. Brill, 1155 pp.
- Sabrosky, C. W. 1956. Additions to the knowledge of the Old World Asteiidae (Diptera). *Revue Française d'Entomologie* 23: 216–243.
- . 1999. Family-group names in Diptera. *Myia* 10: 1–576.
- Sabrosky, C. W. and W. W. Wirth. 1956. Notes and exhibitions. *Proceedings of the Hawaiian Entomological Society* 16: 18.
- . 1959. A Formosan ephydrid new to Hawaii (Diptera: Ephydriidae). *Notulae Entomologicae* 38(1958): 109–110.
- Yeates, D. K. and B. M. Wiegmann. 1999. Congruence and controversy: Toward a higher-level phylogeny of Diptera. *Annual Review of Entomology* 44: 397–428.
- Zatwarnicki, T. 1992. A new classification of Ephydriidae based on phylogenetic reconstruction (Diptera: Cyclorrhapha). *Genus* 3(2): 65–119.